JAPANESE [JP,09-048989,A]



[Translation done.]



## DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the oil constituent for impregnating bearings which could reduce the coefficient of friction in a sintered alloy bearing part, and could prevent wear, and was excellent in various bearing material conformity in detail about the oil constituent for impregnating bearings.
[0002]
[Description of the Prior Art]A sintered alloy bearing impregnates with a lubricating oil the porous material produced by carrying out sinter molding of this by using iron, copper, tin, lead, zinc, carbon, and other metal powder as a raw material. Can divide this sintered material roughly into a copper system and an iron system, and although the thing of sound, home electronics (VTR, a car stereo, a fan, etc.), and an iron system is used for various motors (fan motor etc.), such as an automobile electric equipment article, the thing of a copper system, The quality is governed by the performance of the lubricating oil (sintered alloy bearing oil) with which it is impregnated. Namely, such a sintered alloy bearing oil is excellent in the heat resistance and oxidation stability at the time of an elevated

temperature, and it is required that the evaporativity by generation of heat of a rotary part should be low, and, as for the many, long lasting nature is required for unsupplied operation. The conformity to the plastic material etc. which are used for the lubricity at the time of high low temperature, a sintered material, or its periphery is also demanded. In addition, with a miniaturization and slimming down of the sintered alloy bearing, since an operating environment is becoming severely and various, in the sintered alloy bearing oil, the further improvement in abrasion resistance, seizing resistance, and oxidation stability serves as pressing need in recent years. The sintered alloy bearing oil used for the capstan shaft carrier and motor bearing of a portable radio cassette recorder, a portable CD player, and a portable MD player is expected reduction of the coefficient of friction from a point of power consumption. Although what adds a specific metal-containing additive agent etc. to base oil is indicated, for example to JP,H7-53984,A as such bearing oil, The abrasion resistance which is the demand characteristics of a sintered alloy bearing oil, oxidation stability, and no characteristics of the low friction coefficient were able to be satisfied also with this bearing oil.

[0003]

[Problem(s) to be Solved by the Invention]This invention is made under such a situation. That is, in a sintered alloy bearing, an object of this invention is to provide the oil constituent for impregnating bearings which reduces the coefficient of friction and makes abrasion resistance and bearing material conformity improve.

[0004]

[Means for Solving the Problem]This invention persons found out that a coefficient of friction in a sintered alloy bearing could be reduced, and the abrasion resistance and bearing material conformity could be made to improve by blending specific phosphorus compounds with base oil as a result of repeating research wholeheartedly that said purpose should be attained. That is, an oil constituent for impregnating bearings characterized by a thing for which this invention is chosen from dihydroKARUBIRU hydrogen phosphite and trihydro cull BIRUHOSUFETO which have the hydrocarbyl group of the carbon numbers 12-30 in base oil, and which blend a kind at least is provided.

[0005]

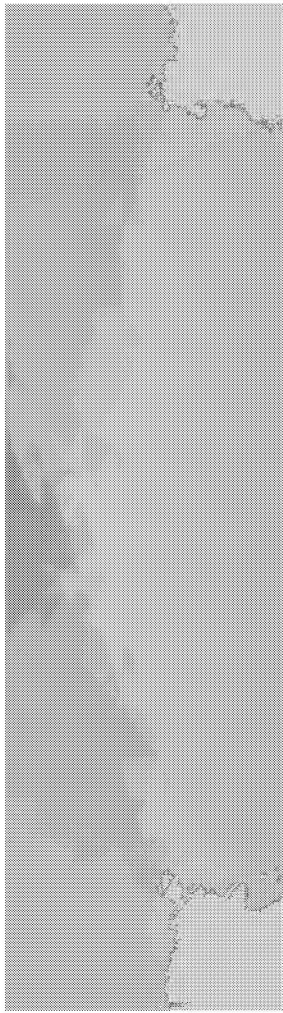
[Embodiment of the Invention]Below, this invention is explained still in detail. What could use what consists of mineral oil and/or synthetic oil as base oil of the oil constituent for impregnating bearings of this invention, and blended the viscosity index improver with these can be used. Although there is no restriction in particular about the kind and various descriptions, what has the kinetic viscosity at 40 ** in the range of 5-500 $mm^2$ / second can be used

for mineral oil and synthetic oil which can be used in this invention. When there are faults, such as a fall of film strength and an increase in an evaporation loss, when the above-mentioned kinetic viscosity is less than 5 $mm^2$ / second, and exceeding 500 $mm^2$ / second, viscous resistance increases, and there is a possibility of causing various troubles. As for a mentioned range, since it is such, it is preferred that it is the range of 10-300 $mm^2$ / second. As mineral oil, things which blended the viscosity index improver with these, such as paraffin series mineral oil, Motoi Nakama system mineral oil, or naphthene system mineral oil obtained, for example by purification methods, such as solvent refining, hydrorefining, hydrocracking, and a dewaxing process, are mentioned here.

[0006]As synthetic oil, for example Polybutene, polyolefine (an alpha olefin copolymer is included), Things which blended the viscosity index improver with these, such as various ester (for example, a polyol ester, a dibasic acid ester, phosphoric ester, etc.), various ether (for example, polyphenyl ether etc.), alkylbenzene, and alkyl naphthalene, are mentioned. In this invention, it can be used as base oil, combining the above-mentioned mineral oil two or more sorts, and can be used also about synthetic oil, combining the above-mentioned thing two or more sorts. It can also be used combining each of the above-mentioned mineral oil and synthetic oil.

[0007]As the above-mentioned base oil, the thing containing the Polly alpha olefin, ethylene-alpha olefin copolymers, or those hydrides is used preferably, Especially as Polly alpha olefin, oligomer of the alpha olefin of the carbon numbers 6-14 is used preferably, and ethylene propylene rubber is preferably used as an ethylene-alpha olefin copolymer. In this invention, as base oil, especially (a) Polly alpha olefin or its hydride, (b) An ethylene-alpha olefin copolymer or its hydride and (c) (c-1) Polly alpha olefin, ethylene-alpha olefin copolymers, or these hydrides, (c-2) a mixture with alkylbenzene or alkyl naphthalene, and ********** -- it is preferred from a point of the low-temperature characteristic or sludge occurrence prevention to use a kind, even if small. What blended the viscosity index improver with these can be used.

[0008]The above-mentioned base oil produces "the escape of oil pressure" by the oil permeability of the charge of a bearing material at the time of the use in an elevated temperature, There is no fault, such as film strength falling, or the leak rate of the oil from a bearing increasing, and shortening the life of a bearing, or soiling the circumference, and the problem of supply of the oil to a lubricating part running short due to the fluid fall of an oil at the time of low temperature starting is not produced, either. As the alkylbenzene used for base oil in this invention, or alkyl naphthalene, the carbon numbers 6-30 and the thing which has at least one alkyl substituent of 10-24 preferably can be used for each of the benzene ring and a



naphthalene ring. As for the above-mentioned alkylbenzene in base oil, or the content of alkyl naphthalene, it is preferred that it is 3 to 90 % of the weight. When addition of alkylbenzene or alkyl naphthalene, especially base oil contain 3% of the weight or more, the effect which controls the distributivity fall in a stoma of the oil by generating of sludge is done so. There is a possibility of an aniline point falling when the above-mentioned content exceeds 90 % of the weight, the sealant of the circumference of a bearing causing swelling and contraction, and the leak rate of the oil from a bearing increasing, and also producing the aforementioned fault due to the fall of a viscosity index at the time of elevated-temperature use and low temperature starting. As for especially the content of the above-mentioned various points to alkylbenzene or alkyl naphthalene, it is still more preferred that it is 3 to 60 % of the weight three to 75% of the weight of base oil.

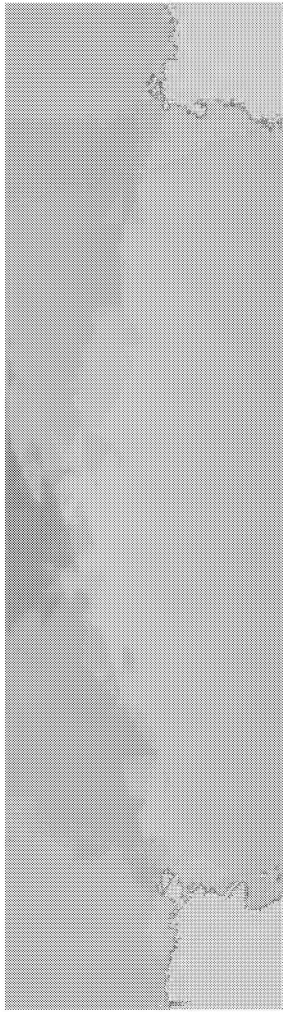
[0009]As a viscosity index improver which can be used for the above-mentioned base oil, olefin (**) polymers, such as ethylene propylene rubber, poly methacrylate, polyisobutylene, etc. are mentioned preferably, and poly methacrylate is especially used preferably from a point of the low-temperature characteristic. As the molecular weight, it is preferred 10,000-1,000,000 and also 10,000-100,000, and that it is especially 10,000-50,000 at the point of shear stability to a number average molecular weight.

[0010]The oil constituent for impregnating bearings of this invention is a thing by which hydrocarbyl group is chosen as the above-mentioned base oil from the dihydroKARUBIRU hydrogen phosphite and trihydro cull BIRUHOSUFETO which are the carbon numbers 12-30 and which blends a kind at least. As dihydroKARUBIRU hydrogen phosphite used here, what is expressed with following general formula (I) is used preferably.

$(R^1O)_2POH$ ... (I)

In the above-mentioned general formula (I), the alkyl group or alkenyl group of the carbon numbers 12-30 is respectively mentioned preferably as $R^1$. That whose carbon number of the hydrocarbyl group in the above-mentioned dihydroKARUBIRU hydrogen phosphite is less than 12 is inferior to stability, and becomes easy to generate sludge. That in which the carbon number exceeds 30 has small effects, such as lubricity, to loadings, and is difficult to receive. As a carbon number of such a point to hydrocarbyl group, it is preferred that it is 14-22. As dihydroKARUBIRU hydrogen phosphite used in this invention, Specifically, dilauryl hydrogen phosphite, dipalmityl hydrogen phosphite, distearyl hydrogen phosphite, dioleoyl hydrogen phosphite, etc. are mentioned.

[0011]As trihydro cull BIRUHOSUFETO used in this invention, what is expressed with following general formula (II) is used



preferably.

$(R^2O)_3P=O$ ... (II)

In the above-mentioned general formula (II), as $R^2$, an alkyl group or an alkenyl group is preferred, and the thing of 12-30, and also 14-22 is preferably used for a carbon number for the same Reason as the case where it is the above-mentioned dihydroKARUBIRU hydrogen phosphite. Specifically as trihydro cull BIRUHOSUFETO used in this invention, trilauryl phosphate, TORIMIRISUCHIRU phosphate, tripalmityl phosphate, Triste allyl phosphate, trio rail phosphate, etc. are mentioned.

[0012]The oil constituent for impregnating bearings of this invention has a preferred thing which is chosen from the above-mentioned dihydroKARUBIRU hydrogen phosphite and trihydro cull BIRUHOSUFETO and which contain a kind in 0.01 to 10% of the weight of quantity at least. When the effect of this invention is hardly accepted when the above-mentioned content is less than 0.01 % of the weight, and exceeding 10 % of the weight, the effect of addition is saturated, and it becomes easy to generate sludge. Since it is such, as for the above-mentioned content, it is still more preferred that it is 0.1 to 5 % of the weight, and it is preferred that it is especially 0.1 to 3 % of the weight. If it is in a mentioned range, it can be used combining using it in this invention, combining dihydroKARUBIRU hydrogen phosphite two or more sorts, and trihydro cull BIRUHOSUFETO two or more sorts. The thing of dihydroKARUBIRU hydrogen phosphite and trihydro cull BIRUHOSUFETO respectively used combining more than a kind is also possible.

[0013]accepting necessity in the range in which the purpose of this invention is not spoiled by the oil constituent for impregnating bearings of this invention -- a viscosity index improver, pour point depressant, and an ash-free system -- a dispersing agent, a metal system cleaning agent, an antioxidant, an oily agent, a rust-proofer, a surface-active agent, a defoaming agent, a friction modifier, etc. can be blended according to a use. Various sintered-metal material is impregnated with the oil constituent for impregnating bearings of this invention, and it is used as a sintered alloy bearing. Although such a sintered alloy bearing can be used for various kinds of bearings, it is applicable to capstan shaft carriers and motor bearing, such as a portable radio cassette recorder, a portable CD player, and a portable MD player, for example.

[0014]

[Example]Next, although working example explains this invention still more concretely, this invention is not limited at all by these examples. The performance of the oil constituent for impregnating bearings was evaluated in accordance with the method shown below.

(1) According to shell wear test Japan Petroleum Institute JPI-5S-32-90, the diameter (mm) of the abrasion was measured in the following condition.
Number of rotations: 1200 rpm, load : 40kgf oil temperature : 50 **, temperature : According to 60-minute (2) pendulum examination Society of Automotive Engineers of Japan JASO M314-88, the coefficient of friction was measured in the following condition.
Ball :SUJ2 (3/16 inch)
Roller pin: SUJ2, oil temperature : After immersing the 25 ** (3) bearing material immersion test following bearing material in each test oil at 120 ** for 100 hours and doing an immersion test, the yield of the existence of the corrosion of a bearing material and sludge of test oil was evaluated. Here, the yield of sludge was measured using the Millipore filter with the aperture of 0.8 micro.
Bearing material: An iron system, a JIS B1581 SBF 2118 equivalent copper system, JIS B1581 SBK 1218 equivalent [0015]The oil constituent for impregnating bearings was prepared using the base oil shown in working example 1-4 and the comparative example 1 - the 4 1st table by the blending ratio (% of the weight) shown in the 2nd table, and the various performances were evaluated. A result is shown in the 2nd table.
[0016]
[Table 1]

第 1 表

| | 基油(1) | 基油(2) | 基油(3) |
|---|---|---|---|
| ポリ－α－ オレフィン [1] (wt%) | 100 | — | — |
| ポリ－α－ オレフィン [2] (wt%) | — | 65 | 27 |
| ポリ－α－ オレフィン [3] (wt%) | — | 30 | 43 |
| アルキルベンゼン [4] (wt%) | — | 5 | — |
| アルキルナフタレン [5] (wt%) | — | — | 30 |
| 動粘度 40℃ | 30.7 | 99.9 | 99.3 |
| ($mm^2/s$) 100℃ | 5.84 | 13.70 | 13.69 |
| 粘度指数 | 137 | 138 | 139 |
| 流動点 (℃) | -50 > | -50 | -40 |
| 引火点 (℃) | 238 | 264 | 252 |

[0017]1) Polly alpha olefin : kinetic viscosity (100 **) 6cSt (decene oligomer by an ethyl company)
2) Polly alpha olefin : kinetic viscosity (100 **) 10cSt (decene oligomer by an ethyl company)

3) Polly alpha olefin : kinetic viscosity (100 **) 40cSt (decene oligomer by an ethyl company)
4) Alkylbenzene : kinetic viscosity (40 **) 50cSt (branch-type heavy alkylbenzene which has 1-2 alkyl groups of $C_{12}$)

5) Alkyl naphthalene : kinetic viscosity (40 **) 28cSt (alkyl naphthalene which has an alkyl group of $C_{16}$ or $C_{18}$)

[0018]
[Table 2]

第 2 表－1

| | | | 実施例1 | 実施例2 | 実施例3 | 実施例4 |
|---|---|---|---|---|---|---|
| 基油（1） | | | 97.0 | — | — | 97.0 |
| 基油（2） | | | — | 97.0 | — | — |
| 基油（3） | | | — | — | 97.0 | — |
| ジオレイルハイドロジェンホスファイト | | | 2.0 | 2.0 | — | — |
| ジラウリルハイドロジェンホスファイト | | | — | — | — | 2.0 |
| トリオレイルホスフェート | | | — | — | 2.0 | — |
| ジブチルハイドロジェンホスファイト | | | — | — | — | — |
| ジオレイルアシッドホスフェート | | | — | — | — | — |
| トリオレイルホスファイト | | | — | — | — | — |
| トリクレジルホスフェート | | | — | — | — | — |
| 酸化防止剤* | | | 1.0 | 1.0 | 1.0 | 1.0 |
| 振り子摩擦係数 | | | 0.10 | 0.10 | 0.10 | 0.10 |
| シェル摩耗 (mm) | | | 0.44 | 0.43 | 0.48 | 0.44 |
| 軸受浸漬試験 | 銅系 | 腐食の有無 | 無 | 無 | 無 | 無 |
| | | スラッジ(mg/100ml) | 1.8 | 0.6 | 0.7 | 1.9 |
| | | (ミリポア0.8 μ) | | | | |
| | 鉄系 | 腐食の有無 | 無 | 無 | 無 | 無 |
| | | スラッジ(mg/100ml) | 1.7 | 0.6 | 0.6 | 1.8 |
| | | (ミリポア0.8 μ) | | | | |

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[0019]
[Table 3]

第２表－２

| | | | 比較例１ | 比較例２ | 比較例３ | 比較例４ |
|---|---|---|---|---|---|---|
| 基油（１） | | | 97.0 | 97.0 | 97.0 | 97.0 |
| 基油（２） | | | — | — | — | — |
| 基油（３） | | | — | — | — | — |
| ジオレイルハイドロジェンホスファイト | | | — | — | — | — |
| ジラウリルハイドロジェンホスファイト | | | — | — | — | — |
| トリオレイルホスフェート | | | — | — | — | — |
| ジブチルハイドロジェンホスファイト | | | 2.0 | — | — | — |
| ジオレイルアシッドホスフェート | | | — | 2.0 | — | — |
| トリオレイルホスファイト | | | — | — | 2.0 | — |
| トリクレジルホスフェート | | | — | — | — | 2.0 |
| 酸化防止剤* | | | 1.0 | 1.0 | 1.0 | 1.0 |
| 振り子摩擦係数 | | | 0.10 | 0.10 | 0.14 | 0.13 |
| シェル摩耗 （mm） | | | 0.40 | 0.43 | 0.85 | 0.71 |
| 軸受浸漬試験 | 銅系 | 腐食の有無 | 有 | 有 | 無 | 無 |
| | | スラッジ(mg/100ml)（ミリポ0.8 μ） | 10.8 | 13.1 | 0.6 | 0.5 |
| | 鉄系 | 腐食の有無 | 有 | 有 | 無 | 無 |
| | | スラッジ(mg/100ml)（ミリポ0.8 μ） | 11.3 | 12.8 | 0.5 | 0.5 |

＊チバガイギー社製イルガノックスＬ５７（ジフェニルアミン系酸化防止剤）

[0020]
[Effect of the Invention]Various kinds of sintered-metal material is impregnated with the oil constituent for impregnating bearings of this invention, and it can reduce the coefficient of friction and can make abrasion resistance and bearing material conformity improve as a sintered alloy bearing.

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[Translation done.]